

## CLAIMS

We claim:

1. A prepolymer composition comprising the reaction product of 4,4'-diphenylmethane diisocyanate with a polyol composition comprising a propylene oxide based polyether polyol and consisting essentially of at least 80 wt% perfect prepolymers and less than 2 wt% free MDI monomer.

2. The prepolymer composition of Claim 1 in which the 4,4'-diphenylmethane diisocyanate comprises isomeric mixtures of MDI and/or polymeric MDI.

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3. The prepolymer composition of Claim 1 in which the 4,4'-diphenylmethane diisocyanate comprises an isomeric mixture of MDI containing 30 – 98 wt% of 4,4' isomer, 2 – 70 wt% of the 2,4' isomer, and 0 – 5 wt% of the 2,2' isomer (with the wt% totaling 100%); and/or polymethylene poly(phenylisocyanate) having an average isocyanate functionality of 2.1 to 3.5, isocyanate group content of 18.0 to about 33.6, and containing about 30 to 96 wt% monomeric 4,4' MDI, about 2 – 70 wt% monomeric 2,4' MDI, and less than 5 wt% monomeric 2,2' MDI, and from 2 – 60 wt% higher ring homologues of the MDI series (with the wt% totaling 100%)

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4. The prepolymer composition of Claim 1 in which the propylene oxide based polyether polyol is a polypropylene polyether polyol with functionality of two or greater and an average equivalent weight between 100 and 3000.

5. The prepolymer composition of Claim 1 in which the propylene oxide based polyether polyol is an ethylene oxide capped polypropylene polyether polyol.

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6. The prepolymer composition of Claim 1 in which 0 to 60 wt% of the polyol composition comprises a di- or multi-functional alkylene ether polyol, a polyester polyol, a polyester polyol from polycaprolactones or a hydroxyl terminated polybutadienes

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7. The prepolymer composition of Claim 1 consisting essentially of at least 90 wt% perfect prepolymers.

8. The prepolymer composition of Claim 1 consisting essentially of less than  
10 1 wt% free MDI monomer.

9. The prepolymer composition of Claim 1 containing a free prepolymer NCO functionality ranging from 0.2 to 15 wt%.

15 10. The prepolymer composition of Claim 1 in which the polyol composition has an average Mn ranging from about 400 to 16,000.

11. A prepolymer composition comprising the reaction product of 4,4'-diphenylmethane diisocyanate with a polyol composition comprising a polypropylene  
20 polyether polyol with functionality of two or greater and an average equivalent weight between 100 and 8000 and consisting essentially of at least 90 wt% perfect prepolymers, less than 2 wt% free MDI monomer and a free prepolymer NCO functionality ranging from 0.2 to 15 wt%.

12. The prepolymer composition of Claim 11 in which the 4,4'-diphenylmethane diisocyanate comprises an isomeric mixture of MDI containing 30 – 98 wt% of 4,4' isomer, 2 – 70 wt% of the 2,4' isomer, and 0 – 5 wt% of the 2,2' isomer (with the wt% totaling 100%); and/or polymethylene poly(phenylisocyanate) having an average isocyanate functionality of 2.1 to 3.5, isocyanate group content of 18.0 to about 33.6, and containing about 30 to 96 wt% monomeric 4,4' MDI, about 2 – 70 wt% monomeric 2,4' MDI, and less than 5 wt% monomeric 2,2' MDI, and from 2 – 60 wt% higher ring homologues of the MDI series (with the wt% totaling 100%)
13. The prepolymer composition of Claim 11 in which the propylene oxide based polyether polyol is an ethylene oxide capped polypropylene polyether polyol.
14. The prepolymer composition of Claim 11 in which 0 to 60 wt% of the polyol composition comprises a di- or multi-functional alkylene ether polyol, a polyester polyol, a polyester polyol from polycarbonate or a hydroxyl terminated polybutadiene.
15. The prepolymer composition of Claim 14 consisting essentially of less than 0.5 wt% free MDI monomer and containing a free prepolymer NCO functionality ranging from 0.5 to 8 wt%.
16. The prepolymer composition of Claim 15 in which the polyol composition has an average Mn ranging from about 400 to 16,000.

17. In a polyurethane adhesive composition comprising a polyurethane prepolymer composition and, optionally, an isocyanate-reactive curative, the improvement which comprises the prepolymer composition of Claim 1.

5            18. In a polyurethane adhesive composition comprising a polyurethane prepolymer composition and, optionally, an isocyanate-reactive curative, the improvement which comprises the prepolymer composition of Claim 11.